LAKEFIELD JUNCTION TO SPLIT ROCK 345 KV PROJECT INFORMATION REQUEST NO. 11 RESPONSE

CONSTRUCTION PERIOD RELIABILITY, SCHEDULE AND COST IMPLICATIONS

Summary

This multi-part request addresses important criteria for evaluating the differences between the Alliant Route and the Interstate Route for the 345 kV transmission line. Selecting a route requires the balancing of several factors, including:

- Landowner impacts
- Environmental and cultural impacts
- Cost
- Reliability during construction
- Reliability after construction
- Schedule for completing construction

Xcel Energy believes that the Interstate Route best balances these criteria. The Interstate Route, as proposed by Xcel Energy, consists of approximately 58 miles of single-circuit 345 kV on new right-of-way and 28 miles of double circuit 345/161 kV construction.[1] There are several key reasons why Xcel Energy prefers the Interstate Route. These reasons are summarized here and discussed in more detail below, accompanied by charts and graphs for illustration purposes.

- Interstate Route Appropriately Balances Impacts With Cost:

  — Environmental Impact Study (EIS) data show that land use, environmental and cultural impacts are comparable between the two options. The costs, however, are significantly different. The Alliant Route will cost **$7 million** more than the Interstate Route due to additional double-circuit poles. The added expense does not result in any appreciable reduction in impacts.

  — The Interstate Route properly considers costs and impacts by utilizing double circuit structures in the three most congested areas: 1) approximately seven miles near Lakefield Junction where a number of transmission lines exist, 2) a 12-mile segment located north of the Worthington airport to address height limitations, and 3) nine miles of double circuit in South Dakota, another area with a number of existing transmission lines. Double circuiting in these areas allows for consolidation of lines and a resulting reduction in impacts to landowners.

[1] This includes both South Dakota and Minnesota portions of the route.

- Alliant Route Causes Significant Schedule Delay: As EQB Staff is aware, the demand for outlet capacity to serve wind generators on the Buffalo Ridge exceeds the available outlet capacity. These transmission improvements are needed so that 825 MW of outlet capacity can be achieved. If the Alliant Route is chosen, the in-service date of the 345 kV line would be delayed by approximately 13 months. Even if the line were constructed using hot line techniques (which would further increase costs), the project would be delayed six months. Delay has potentially large financial implications for developers, utilities and consumers. During the delay period, significant wind-generated energy would be unable to be delivered into the transmission system. And the likelihood of additional "curtailment" payments for wind energy that cannot be delivered would be increased. This results in an inefficient use of a renewable resource as well as additional costs to the Company and its customers.

- Alliant Route Creates Increased Reliability Risks During Construction: The Alliant Energy-owned 161 kV line serves significant load serving functions all along Interstate 90. There are five substations that depend on the operation of the 161 kV line to provide the necessary sources of power to the neighboring communities. These substations are: Magnolia, Elk, Brewster, Triboji and Heron Lake. If the Alliant Route is chosen, there would be significant periods of time where one or more of these substations would be operating radially i.e., with only one 161 kV source. This would place those customers in the affected area at an increased risk of an outage because if the remaining line fails, there is no source to provide power. The most significant risk would be experienced by the City of Worthington because the Alliant Route construction would require the Elk Substation to be operated radially for a 22-week period. In contrast, the Interstate Route would require outages of the 161 kV line of a much shorter duration. In the case of the Elk Substation, the 161 kV line would only need to be out of service for six weeks, a period of time that the utilities serving load in the area (Great River Energy and City of Worthington Municipal Utilities) have stated is a manageable risk. Xcel Energy believes that this reliability risk creates a significant impediment to the Alliant Route and that it would be unacceptable to Alliant Energy and the affected communities.

- Hot Line Construction on Alliant Route is Not Appropriate: Xcel Energy does not support use of the hot line construction technique (rebuilding a transmission line while it remains energized) as a method to speed construction of the Alliant Route because it does not provide benefits necessary to justify the additional cost. Construction could be shortened from 31 to 24 months, but this is still six months longer than the Interstate Route. The use of this technique also adds an additional $2,000,000 to the project cost, making the Alliant Route $9,000,000 more expensive than the Interstate Route. The hot line technique also places workers at greater risk of injury due to their proximity to an energized wire.

Detailed Discussion

1. Alliant Route Will Delay Increase in Wind Outlet Capacity

Route selection and the sequence in which the line can be constructed affect both reliability and schedule. The sequence of construction for the Interstate and Alliant routes are presented here.

Construction of either route will begin on the east end because 1) the Minnesota route permit will be issued about seven months before the South Dakota permit, and 2) starting from the east end provides better options for providing dual feeds to substations during construction of double circuit segments, reducing the outage risk during construction.

The sequence of construction for each route is shown in Figures I-1 through I-5 for the Interstate Route and in Figures A-1 through A-7 for the Alliant Route. These figures break the routes into segments A through L to explain the sequence of events. The Interstate route utilizes segments A, B, C, D, E and F. The Alliant Route utilizes segments A, G, H, I, C, D, J, K, L, F. In these figures, a thin red line indicates a segment under construction during that phase. A thin blue line indicates a segment for which construction is complete. Wider purple, green and orange highlights indicate electric feeds to the various substations. At the top of each sheet is a summary showing the which substations will be on a radial for each construction phase.

Interstate Route

The Minnesota portion of the Interstate Route consists of approximately 56 miles of single circuit 345 kV on a new alignment and approximately 18 miles of double circuit 345/161 kV on the existing Alliant Energy alignment.

Construction of the Interstate Route will take 18 months. The Interstate Route allows two construction contractors to work in parallel, one building single circuit 345 kV on the new alignment and the second rebuilding portions of the 161 kV line to double circuit 345/161. Table 1 and Figures I-1 through I-5 explain the sequence for the Interstate Route.

Table 1 – Interstate Route Construction Sequence

Figure	Duration (weeks)	Segment		Comment
		Crew 1	Crew 2	
I-1	28	E	B	Each contractor builds single circuit 345 kV on new ROW.
I-2	11	E	A	Completed segment B is temporarily energized at 161 kV to maintain two 161 kV sources to all substations (looped service). This allows segment A to be de-energized for construction.
I-3	6	E	C	Completed segments A and B are temporarily energized at 161 kV to maintain two 161 kV sources to Heron Lake, Brewster and Triboji. Elk Substation is served by a single 161 kV line and is at risk of outage during this phase.
I-4	12	E	D	Completed segments A, B and C are temporarily energized at 161 kV to provide two 161 kV sources to Heron Lake, Brewster, Elk and Triboji. Four-mile long segment C uses both sides of the double circuit poles to provide dual feeds to Elk Substation.
I-5	17	F	N/A	Completed segments A, B, C, D, E energized at 161 kV to provide dual feeds to all substations.

Alliant Route

The Minnesota portion of the Alliant Route consists of approximately seven miles of single circuit 345 kV on a new alignment and approximately 68 miles of double circuit 345/161 kV on the existing Alliant Energy alignment. The construction sequencing Figures A-1 through A-7 show segments A through L, which are discrete line sections between substations.

Construction of the Alliant Route will take 31 months. Unlike the Interstate Route, only one segment can be constructed at a time on the Alliant Route. This is because at least one 161 kV source must be connected to each substation at all times to provide power for the local communities. De-energizing any two segments simultaneously would result in unacceptable outages to one or more substations. Table 2 and Figures A-1 through A-7 depict the sequencing of Alliant Route construction.

Table 2 – Alliant Route Construction Sequence

Figure	Duration (weeks)	Segment		Comment
		Crew 1	Crew 2	
A-1	11	G	N/A	Contractor builds single circuit 345 kV segment G on new ROW.
A-2	11	A	N/A	Completed segment G is temporarily energized at 161 kV to maintain two 161 kV sources to all substations (looped service). This allows segment A to be de-energized for construction.
A-3	11	H	N/A	Completed segments A and G are temporarily energized at 161 kV to maintain two 161 kV sources to Heron Lake and Triboji. Brewster and Elk substations are served by a single 161 kV line and are at risk of outage during this phase.
A-4	11	C, I	N/A	Completed segments A, G and H are temporarily energized at 161 kV to provide two 161 kV sources to Heron Lake, Brewster and Triboji. Elk Substation is served by a single 161 kV line and is at risk of outage during this phase. Segment H energized on both sides of double circuit poles.
A-5	41	D, J	N/A	Completed segments A, G, H, I, C energized at 161 kV to provide dual feeds to Heron Lake, Brewster, Elk and Triboji substations. Segments H, I and C energized at 161 kV on both sides of double circuit poles.
A-6	17	K	N/A	Completed segments A, G, H, I, C, D, J energized at 161 kV to provide dual feeds to Heron Lake, Brewster, Elk, Magnolia and Triboji. Segments H, I, C, D and J energized on both sides of double circuit poles.
A-7	32	L, F	N/A	Completed segments A, G, H, I, C, D, J, K energized at 161 kV to provide dual feeds to all subs.

Comparison of Schedules for Alliant and Interstate Routes

A graphic showing the schedules for the Alliant Route and the Interstate Route side by side is shown in Table 3.

Table 3 – Schedule Impact of Route Selection

	Construction Duration		
Route	**Weeks**	**Months**	**Completion Date**
Interstate Route	77	18	Aug-07
Alliant Route	135	31	Sep-08
Alliant Route with hot work[2]	102	24	Feb-08

As shown in Table 3, the Interstate Route can be constructed in less time. This is because a significant portion of the route in Minnesota – 56 miles – is on right-of-way that does not have a transmission line presently on it. This allows two construction contractors to work in parallel, one building single circuit on new right-of-way and the second rebuilding portions of the 161 kV line to double circuit 345/161. Figures I-1 to I-5 show the sequence of this parallel-path construction and Figure 2 shows the parallel-path schedule in Gantt chart format.

The Alliant Route must be built sequentially – one segment between substations at a time – to maintain electric service to customers. Therefore, the Alliant Route will take an additional 13 months of construction to complete. Figures A-1 to A-7 show the construction sequence and Figure 2 shows the schedule in Gantt chart format.

2. Alliant Route Has Increased Reliability Risk During Construction

Minimizing the risk of outages to customers is an important consideration in the choice of transmission line route and in selecting construction methods. The Interstate Route can better minimize this risk by limiting the number of substations and the length of time each substation is served by only one 161 kV transmission source.

Typical Operation of Transmission System

To avoid outages to customers, the transmission system has built-in redundancy to allow the system to be self healing. That is, any one element can fail (a transmission line or a substation component), and the remaining system is able to absorb the load such that no customers experience outages. This is called single contingency, or N-1, planning. De-energizing a transmission line for reconstruction, as would be required here, typically removes the redundancy. If the remaining power source is then lost, there would be no backup available and customers would experience an outage.

[2] For a discussion of hot work technique, see Section 3.

Large Area Served by the 161 kV Lines

Two existing 161 kV lines are affected by this project – Lakefield Junction to Split Rock and Lakefield Junction to Spencer, Iowa. These lines provide the only high voltage transmission sources that bring power to a large area of southwestern Minnesota and northwestern Iowa. The areas served by these 161 kV lines include portions of Rock, Murray, Nobles, Jackson, Cottonwood, Redwood and Brown counties in Minnesota and Osceola and Dickinson Counties in Iowa. This area, including the 69 kV lines and substations served by the 161 kV system, is shown in Figure 1.

The Lakefield Junction to Split Rock 161 kV line is powered from its two terminal ends – the Split Rock Substation on the west and the Lakefield Junction Substation on the east. Four transmission substations are located on this line (Heron Lake, Brewster, Elk, Magnolia). Heron Lake, Elk and Magnolia substations each have transformers that step the voltage down to 69 kV. The 69 kV lines exiting each of these substations then serve distribution substations throughout the area. No customers are served directly from these substations.

Brewster Substation has transformers that step the voltage down to distribution voltage to serve Minnesota Soybean Processors. The 161 kV line also serve one generator, a wind farm located in eastern Rock County.

As will be discussed later, if either Heron Lake, Brewster or Elk substation becomes separated from both of the 161 kV sources (Split Rock or Lakefield Junction), outages will occur to customers in a large area of southwest Minnesota.

Similarly, the Lakefield to Spencer, IA, line provides the only 161 kV sources – from Lakefield Junction and Spencer substations – to a 161/69 kV transmission substation named Triboji. If Triboji Substation becomes isolated from both sources, outages will occur.

Potential of Transferring Loads to Other Distribution Substations

The 161 kV and 69 kV substations described above provide the only sources of power to the distribution substations in the project area (see Figure 1.) Because of this, the loss of all 161 kV sources will cause all distribution substations in the area to have an outage. Therefore transferring loads from one distribution source to another will not improve reliability during construction.

Outages Required for Construction

Construction of 345/161 double circuit will bring an increased risk of outages to customers during the construction period because double circuiting requires segments of the existing 161 kV line to be removed from service for significant periods of time. Xcel Energy will take steps to mitigate the risk, including using newly constructed 345 kV line segments (energized at 161 kV) to maintain two 161 kV sources (looped service) to critical substations in the project area. However, some increased risk will remain.

Figure 1

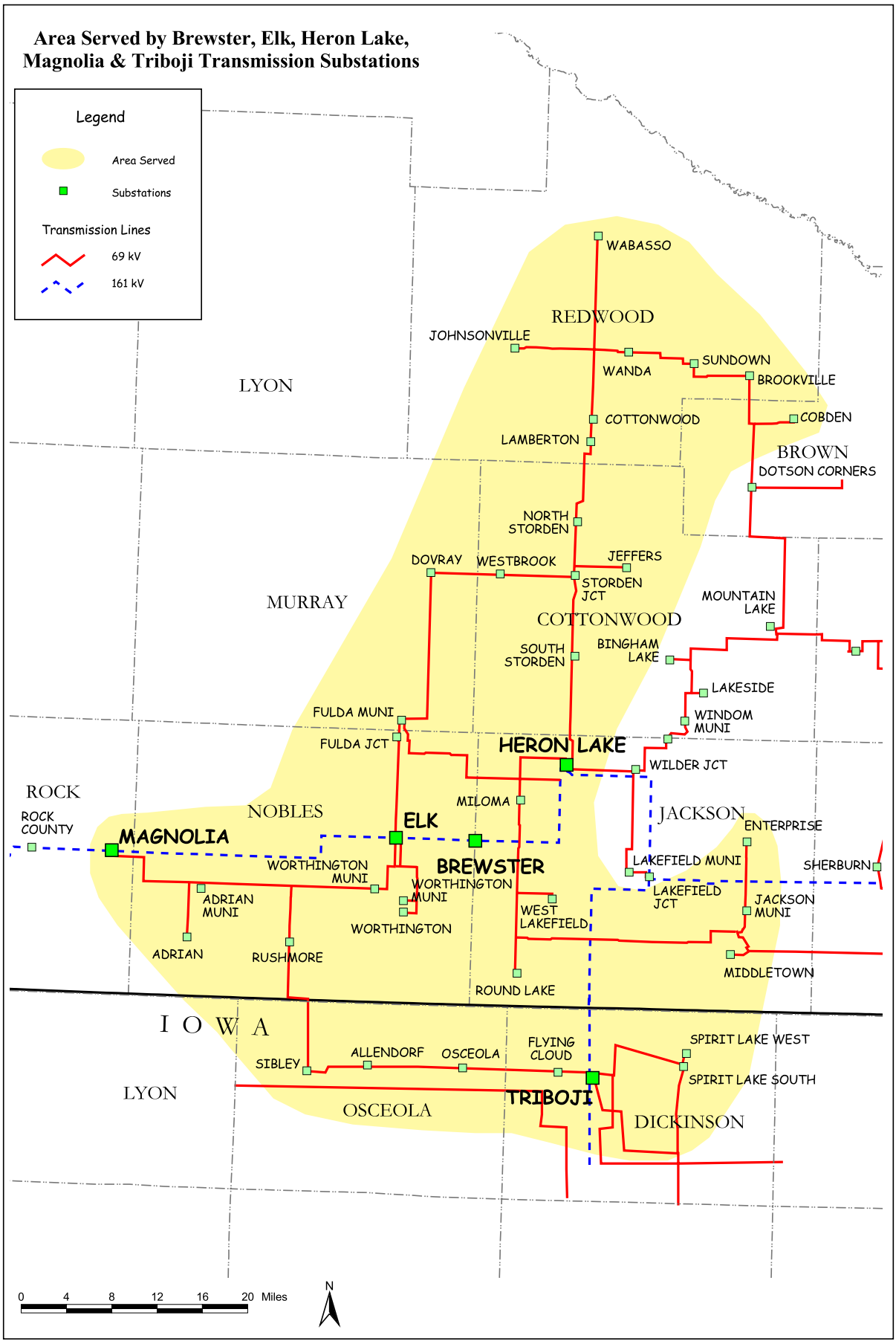
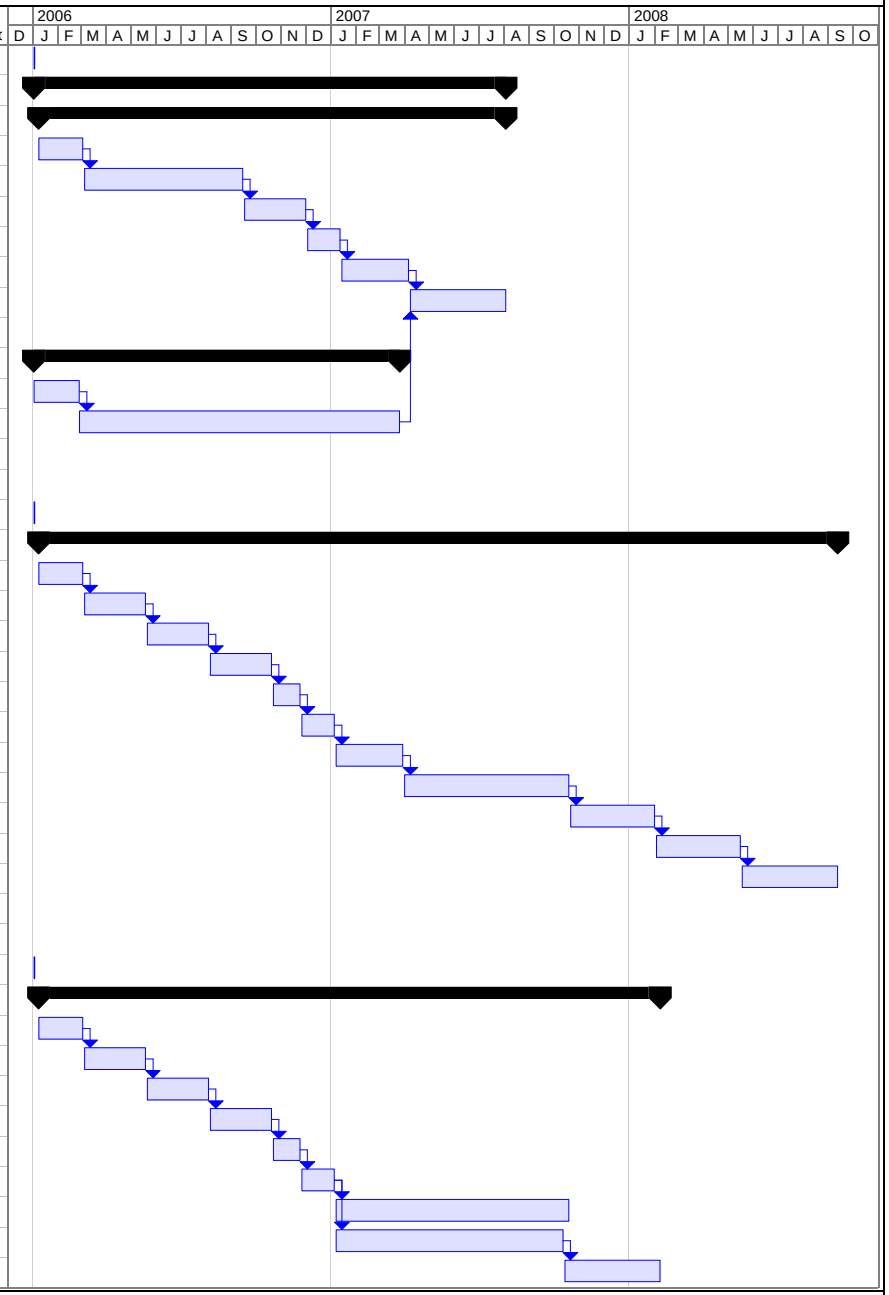

Area Served by Brewster, Elk, Heron Lake, Magnolia & Triboji Transmission Substations
Legend
Area Served
Substations
Transmission Lines
69 kV
161 kV
WABASSO
REDWOOD
JOHNSONVILLE
WANDA
SUNDOWN
BROOKVILLE
LYON
COTTONWOOD
COBDEN
LAMBERTON
BROWN
DOTSON CORNERS
NORTH STORDEN
DOVRAY
WESTBROOK
JEFFERS
STORDEN JCT
MURRAY
COTTONWOOD
MOUNTAIN LAKE
SOUTH STORDEN
BINGHAM LAKE
LAKESIDE
WINDOM MUNI
FULDA MUNI
FULDA JCT
HERON LAKE
WILDER JCT
ROCK
ROCK COUNTY
NOBLES
MILOMA
ELK
JACKSON
ENTERPRISE
MAGNOLIA
WORTHINGTON MUNI
BREWSTER
LAKEFIELD MUNI
SHERBURN
WORTHINGTON MUNI
ADRIAN MUNI
LAKEFIELD JCT
JACKSON MUNI
WEST LAKEFIELD
WORTHINGTON
ADRIAN
RUSHMORE
MIDDLETOWN
ROUND LAKE
I O W A
SIBLEY
ALLENDORF
OSCEOLA
FLYING CLOUD
SPIRIT LAKE WEST
SPIRIT LAKE SOUTH
LYON
TRIBOJI
OSCEOLA
DICKINSON
0 4 8 12 16 20 Miles
N

Figure 2 -- Construction Schedules -- Assuming January 2006 Foundation Start

Xcel Energy IR 11 Response, February 12, 2005

Split Rock to Lakefield Jct Construction Scenarios

ID	Task Name	Duration	Start	Finish	Predec
1	**Interstate Route**	1 day?	Tue 1/3/06	Tue 1/3/06	
2	**345 line segments, 1.5 weeks per mile**	**414 days**	**Tue 1/3/06**	**Fri 8/3/07**	
3	**Contractor A**	**410 days**	**Mon 1/9/06**	**Fri 8/3/07**	
4	Foundations headstart	8 wks	Mon 1/9/06	Fri 3/3/06	
5	B - New ROW - 18.5 miles	28 wks	Mon 3/6/06	Fri 9/15/06	4
6	A - 7 miles	11 wks	Mon 9/18/06	Fri 12/1/06	5
7	C - 4 miles	6 wks	Mon 12/4/06	Fri 1/12/07	6
8	D - 8 miles	12 wks	Mon 1/15/07	Fri 4/6/07	7
9	F - 11 miles	17 wks	Mon 4/9/07	Fri 8/3/07	8,13
10					
11	**Contractor B**	**320 days**	**Tue 1/3/06**	**Mon 3/26/07**	
12	Foundations headstart	8 wks	Tue 1/3/06	Mon 2/27/06	
13	E - New ROW - 37.5 miles	56 wks	Tue 2/28/06	Mon 3/26/07	12
14					
15					
16	**Alliant Route**	1 day?	Tue 1/3/06	Tue 1/3/06	
17	**345 line segments, 1.5 weeks per mile**	**700 days**	**Mon 1/9/06**	**Fri 9/12/08**	
18	Foundations head start	8 wks	Mon 1/9/06	Fri 3/3/06	
19	G - 7 miles	11 wks	Mon 3/6/06	Fri 5/19/06	18
20	A - 7 miles	11 wks	Mon 5/22/06	Fri 8/4/06	19
21	H - 7 miles	11 wks	Mon 8/7/06	Fri 10/20/06	20
22	I - 3 miles	5 wks	Mon 10/23/06	Fri 11/24/06	21
23	C - 4 miles	6 wks	Mon 11/27/06	Fri 1/5/07	22
24	D - 8 miles	12 wks	Mon 1/8/07	Fri 3/30/07	23
25	J - 19 miles	29 wks	Mon 4/2/07	Fri 10/19/07	24
26	K - 10 miles	15 wks	Mon 10/22/07	Fri 2/1/08	25
27	L - 10 miles	15 wks	Mon 2/4/08	Fri 5/16/08	26
28	F - 11 miles	17 wks	Mon 5/19/08	Fri 9/12/08	27
29					
30					
31	**Alliant Route with Hot Work to Speed Construction**	1 day?	Tue 1/3/06	Tue 1/3/06	
32	**345 line segments**	**545 days**	**Mon 1/9/06**	**Fri 2/8/08**	
33	Foundations head start	8 wks	Mon 1/9/06	Fri 3/3/06	
34	G - 7 miles @ 1.5 weeks per mile	11 wks	Mon 3/6/06	Fri 5/19/06	33
35	A - 7 miles @ 1.5 weeks per mile	11 wks	Mon 5/22/06	Fri 8/4/06	34
36	H - 7 miles @ 1.5 weeks per mile	11 wks	Mon 8/7/06	Fri 10/20/06	35
37	I - 3 miles @ 1.5 weeks per mile	5 wks	Mon 10/23/06	Fri 11/24/06	36
38	C - 4 miles @ 1.5 weeks per mile	6 wks	Mon 11/27/06	Fri 1/5/07	37
39	D, J - 27 miles @ 1.5 weeks per mile	41 wks	Mon 1/8/07	Fri 10/19/07	38
40	K, L - 20 miles HOT @ 2 weeks per mile	40 wks	Mon 1/8/07	Fri 10/12/07	38
41	F - 11 miles @ 1.5 weeks per mile	17 wks	Mon 10/15/07	Fri 2/8/08	40



Project: spk to lkj sequencing
Date: Thu 1/27/05

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Comparison of Outage Risks for the Two Routes

Great River Energy (GRE) and Alliant Energy (Alliant) own the transmission facilities that serve the majority of the customer load in the area of this project. Xcel Energy has worked very closely with GRE and Alliant to determine a construction plan that will allow the 345 kV line to be constructed with the minimum risk of outages to customers in the area.

During construction of 345/161 kV double-circuit segments, portions of the existing 161 kV line will be removed from service to allow the reconstruction to double circuit. During this time, one or more substations will be served by a single 161 kV source from Split Rock. In most situations, loss of that remaining 161 kV source results in significant outages.

GRE and Alliant have stated that customer outages will occur if the following substations experience loss of both 161 kV sources serving them: Heron Lake, Brewster, Elk and Triboji. These substations are often referred to as "Critical Subs". Only Magnolia Substation can withstand the loss of both 161 kV lines without outages to customers. The loads can be served by the remaining 69 kV system.

For either route, Xcel Energy will make provisions to temporarily energize the newly constructed 345 line at 161 kV to provide two 161 kV transmission sources to each substation where possible. These temporary configurations, shown in Figures I-2 through I-5 and A-2 through A-7, essentially eliminate any increased outage risk to the Heron Lake and Triboji substations and significantly reduce the risk period for the Elk and Brewster substations.

The Elk Substation is of particular concern because this substation will be most affected by route selection. The load on the Elk Substation is approximately 35 MW. The Elk Substation serves the entire City of Worthington and a portion of the surrounding area. Loss of both 161 kV sources to Elk (one out due to construction and the other lost to an outage event) will result in an outage to the entire City of Worthington. Worthington has some peak-shaving diesel generators, but these units can support only a portion of the city's electric load.

The Brewster Substation is also of concern to the utilities. This substation serves one customer, Minnesota Soybean Processors. This four-megawatt manufacturing customer does not have generator backup.

If the Alliant Route is selected, the Elk Substation would be at risk during a 22-week period while segments H and I are constructed. The Brewster Substation would be at risk for 11 weeks while segment H is rebuilt.

These outage risks would be minimized by selection of the Interstate Route. The risk to the Brewster Substation can be essentially eliminated using the new 345 kV line segment B to temporarily provide a second 161 source from Lakefield Junction. The Interstate Route also reduces the risk to the Elk Substation to six weeks while segment C is constructed. For reliability, the Interstate Route's main advantages are 1) segment B, temporarily energized at 161 kV, can bring a strong second source to the vicinity of the Elk and Brewster substations, and 2) double circuit construction east of the Elk Substation is reduced from 16 miles to four.

For each route, Table 4 shows the outage risks that remain after the temporary configurations. Figure 3 shows the same information in a graphical format.

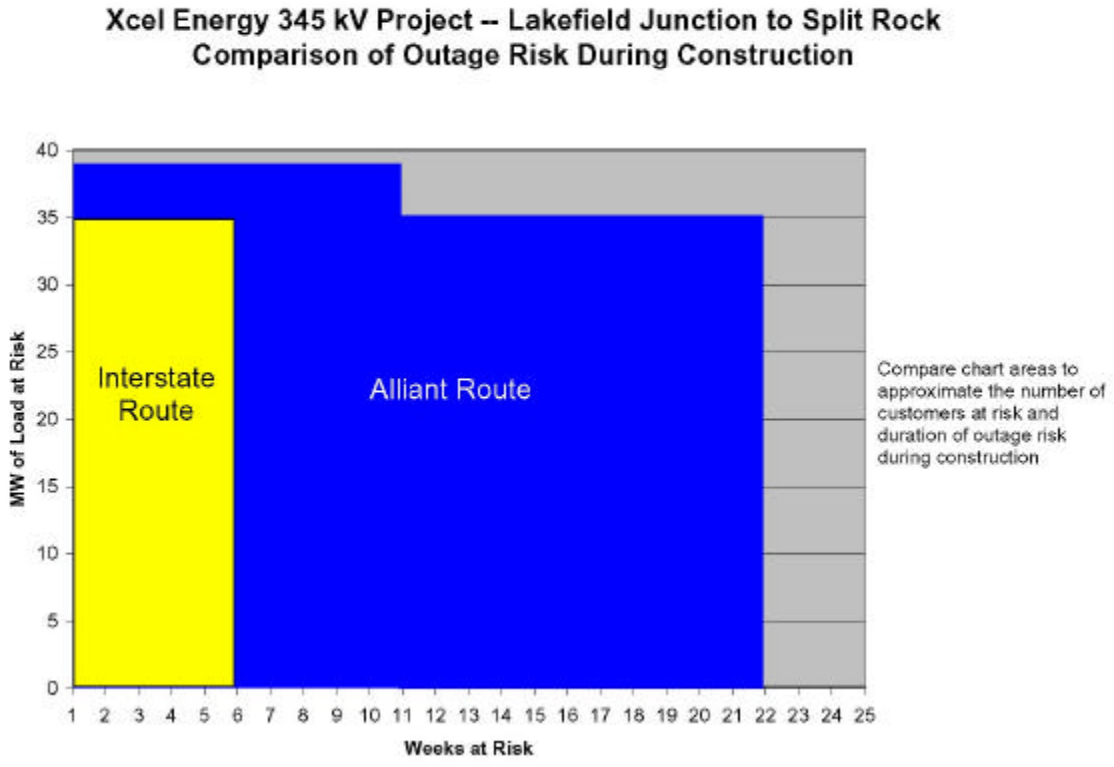
Table 4: Critical Substation Outage Risk

Risk Already Reduced by Use of Temporary Feeds When Possible

	Elk Substation Serving City of Worthington and Surrounding Area		Brewster Substation Serving Minnesota Soybean Processors	
	Weeks at Risk	**MW at Risk**	**Weeks at Risk**	**MW at Risk**
Interstate Route	6	35	0	0
Alliant Route	22	35	11	4

During this time loss of a single transmission component will result in customer outages. Switching to backup sources will be unavailable. Customers will remain out until 161 kV line is restored.

Figure 3: Critical Substation Outage Risk



3. Construction Techniques Cannot Fully Mitigate Delays and Risks Inherent with Alliant Route

Constructing Pole Foundations to Reduce Construction Time

Foundation construction will have little impact on the construction schedule. Xcel Energy plans to use construction methods that will reduce the amount of time the 161 kV line must be removed from service. Low-profile drilling equipment can reduce the need for outages of the 161 kV line during foundation construction. High-early concrete can be used to shorten the time between foundation construction and setting of the pole. Finally, if a line outage is required for foundation construction, the line can be restored very quickly, if necessary, as the line will remain intact and is only de-energized for equipment clearance.

Hot Line Construction Technique

Hot line technique (rebuilding a transmission line while energized) is an appropriate tool if necessary for building relatively short, critical sections of line. However, the added costs and added time of this technique make it an inappropriate choice for constructing the entire line or long segments of the line in this instance. If the hot line technique is used on the Alliant Route, construction of this route will still take six months longer than the Interstate Route and will add $2,000,000 in additional expense, making the Alliant Route $9,000,000 more expensive than the Interstate Route.

In general, Xcel Energy does not support using hot line techniques to rebuild two sections of the 161 kV line at the same time to speed construction. It is unlikely that system operators will allow this practice. This runs contrary to good utility practice and unnecessarily places customers at risk. Whenever the line is handled it is at risk of outage. Unplanned outages can occur when working a line hot because the energized lines are moved with cranes and other devices.

For example, if a 161 kV segment on one side of a substation is out for construction, working on the other 161 kV line feeding that substation, even if worked hot, would unnecessarily put customers at risk because outages can and do still occur even when the line is worked while hot. A possible exception would be using hot line techniques on segments K and L (west of Magnolia) while segments D and J (east of Magnolia) are out for normal construction. The two sources to the Magnolia Substation can both be out at the same time because the Magnolia load can be served by either of the 161 kV lines or the 69 kV system so if the two 161 kV sources are out, the 69 kV acts as backup. Use of hot line technique on the 20 miles segment K+L adds $2,000,000 mentioned earlier.

MEQB Staff also asked about using the hot line construction technique to reduce the reliability risk during construction of the Alliant Route. To reduce the risk of the Alliant Route to a level equal to that of the Interstate Route, segments H and I, totaling 11 miles, would have to be built while the 161 kV line is energized. Using Par Electrical Contractor's estimates, this adds $1,100,000 to the cost of the project and adds an additional six weeks to the length of time required to build the Alliant Route, making it 14.5 months longer than the Interstate Route. While this technique is technically possible, Xcel Energy does not support its use in this situation because an alternative exists (the Interstate Route) that reduces the risk without added expense and delay.

Parallel Construction

Xcel Energy evaluated the possibility of constructing the new 161/345-kV line parallel to the existing structures on the Alliant Route, and then removing the existing structures when the new line was energized. Parallel construction would be limited to areas where there would be minimal resulting landowner conflicts, such as in pasture land.

This method is not preferred because it would add additional cost to the project since it would take more survey, right-of-way and engineering to determine which areas could incorporate this construction method. Also, the structures needed to accommodate the angles for changing the ROW would be more expensive. Moreover, this method would not resolve the reliability issues associated with the Alliant Route. The areas that would be considered to have minimal landowner conflicts would be intermittent along the route, such that the entire section of the line would need to be taken out of service to accommodate parallel construction, which would create the same loss of a 161 kV source to nearby substations.

Use of Mobile Generators

Xcel Energy also analyzed the use of diesel or combustion turbine generators to substitute for the second 161 kV source for the affected substations to reduce the reliability risks associated with the Alliant Route.

According to Worthington Municipal Utilities, combustion turbines (CTs) are not a practical choice as ample gas supplies are not available in the area. Prior to installing its set of backup diesel generators, Worthington considered CT units only to discover the natural gas infrastructure in the area would not support CTs.

Use of diesel generation was analyzed for two substations. For diesel generation to backup the substations and provide the same level of reliability as the 161 kV Alliant Energy line while the 161 kV Alliant Energy line is out of service, the generators would need to run at all times. Monthly rental fees and fuel consumption data was provided by Ziegler Corporation. The costs below include only generator rental and fuel costs. There would also be significant costs to connect the generators to the 69 kV grid – essentially building a temporary substation.

Air emissions and permits have not been addressed and it must be assumed that obtaining necessary permits could create further delay. In any case, even without these additional costs and delays, using diesel generators would create the following rental/fuel costs:

Brewster Substation[3] Load at Brewster is 4 MW. The cost to rent and operate generation to cover the three-month critical period (11 weeks as shown in Table 1) is $1,600,000. Cost to connect the generators to the substation is not included.

[3] Brewster generator costs: 3 units with 1.6 MW continuous rating at $35,400 per month; 1 unit spare at $16,500 per month; fuel consumption 125 gallons per hour per unit at $1.50 per gallon; 3 units operating continuously during 11 weeks of construction

Elk Substation[4] Load at Elk is 35 MW. Cost to rent and operate generation to cover the six-month critical period (22 weeks as shown in Table 1) is $21,000,000 to $23,000,000. The cost to connect the generators to the substation would exceed $1,000,000.

The analysis shows that the use of this type of generation is cost prohibitive. Xcel Energy does not support the use of this approach because benefits do not justify the expense. An alternative exists (the Interstate Route) which does not require the use of backup generation to reduce the outage risk.

For all of the reasons discussed herein, Xcel Energy believes that the MEQB should issue a route permit for the new 345 kV transmission line on the Interstate Route.

Respondent:
Grant Stevenson, Project Manager

[4] Elk generator costs: 22 units with 1.6 MW continuous rating at $35,400 per month; 2 units spare at $16,500 per month; fuel consumption 125 gallons per hour per unit at $1.50 per gallon; 22 units operating continuously during 22 weeks of construction.